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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/693,573 | 10/23/2003 | Svend Frolund | 200315385-1 | 2171 |

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| EXAMINER | |
|---|---|
| ROJAS, MIDYS | |
| **ART UNIT** | **PAPER NUMBER** |
| 2185 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|---|---|---|
| 3 MONTHS | 03/23/2007 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/693,573 | FROLUND ET AL. | |
| | Examiner | Art Unit | |
| | Midys Rojas | 2185 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on *04 December 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *9-23,25-27 and 35-49* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *9-23,25-27 and 35-49* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *01/08/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's Arguments, filed on 12/04/2006, have been fully considered but are not persuasive.

Applicant argues that Matsunami does not teach sending a query message. However, Matsunami discloses sending a query message to each of a plurality of storage devices upon which the stripe of erasure coded data is stored since this system queues the command in a command queuing means which stores and manages the commands. Additionally, Matsunami teaches command interpretation and distribution means 13, Figure 1 wherein distributing the commands, they are being sent to the storage devices.

Applicant argues that Matsunami does not teach the use of a command start message. However, this is disclosed in Figure 1 where the command receipt and end notification means send notification of the start of a command.

Applicant argues that Matsunami does not teach two rounds of messages and replies as recited by claim 9. However, Matsunami discloses sending a query message to each of a plurality of storage devices upon which the stripe of erasure coded data is stored (command interpretation and distribution means 13, Figure 1 wherein distributing the commands, they are being sent to the storage devices); receiving a query reply message from each of at least a first quorum of the storage devices (command start and end detection means 15 and command start and end notification means 11, Figure 1 wherein the notification means notifies of the start of a command); sending a modify message to each of the storage devices (interpreting the host command and generating a disk command which allows for the modification to occur within the

disk, Col. 10, lines 45-67); and receiving a write reply message from each of at least a second quorum of the storage devices (command end message, command start and end detection means 15 and command start and end notification means 11, Figure 1 wherein the notification means notifies of the end of a command). Therefore, Matsunami does teach two rounds of messages and replies.

Applicant argues that Matsunami does not teach an identifier of the erasure-coded data. However, Matsunami discloses access commands to specific logical addresses and therefore it must identify the stripe of erasure-coded data using the address (Col. 11, line 63 – Col. 12, line 9).

Applicant argues that Matsunami does not teach the use of a timestamp. However, Matsunami's system includes a data transfer controller for giving an instruction appropriate transfer timing to the data controller (Col. 10, lines 45-67). Through out the invention of Matsunami the timing of instructions is controller via the data transfer controller, therefore, a timestamp must be provided with the command in order to properly perform this operation. Even though applicant argues that the instruction in question is between the command controller and the data controller and not the disks, the commands that are sent to the data controller are in the process of being sent to the disk and therefore, these commands are commands to the disks.

***Information Disclosure Statement***

2. The information disclosure statement (IDS) submitted on 01/08/07 has been considered by the examiner.

***Claim Rejections - 35 USC § 112***

3. The Following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 9, 25, and 35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear what is meant by the limitation "the first and second quorums each meeting a quorum condition of a number such that any two selections of the number of the stripe blocks intersect in a minimum number of the stripe block needed to decode the stripe". Clarification is necessary.

In view of Applicant's clarification, the 112 rejection of claims 9, 25, and 35 is being maintained. Even though applicant has provided an explanation of the quorum condition as described in the specification, as written in the claims it is still not clear how a quorum condition is met "such that any two selections of the number of the stripe blocks **intersect in a minimum number of the stripe block needed to decode the stripe**". It is not understood how the two selections intersect.

### *Claim Rejections - 35 USC § 102*

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 9-23, 25-27, and 35-49 are rejected under 35 U.S.C. 102(b) as being anticipated by Matsunami et al. (5,740,465).

Regarding Claim 9, Matsunami discloses a method of writing data comprising the steps of receiving a data block for storage within a stripe of erasure coded data (receiving a host command from the host computer), the stripe comprising stripe blocks (data is divided into a plurality of data units called stripes, Col. 1, lines 43-44); sending a query message to each of a plurality of storage devices upon which the stripe of erasure coded data is stored (queuing the command in a command queuing means which stores and manages the commands, in addition, Matsunami discloses command interpretation and distribution means 13, Figure 1 wherein distributing the commands, they are being sent to the storage devices); receiving a query reply message from each of at least a first quorum of the storage devices (command start and end detection means 15 and command start and end notification means 11, Figure 1 wherein the notification means notifies of the start of a command); sending a modify message to each of the storage devices (interpreting the host command and generating a disk command); and receiving a write reply message from each of at least a second quorum of the storage devices (command end message, see Col. 10, lines 45-67 and command start and end detection means 15 and command start and end notification means 11, Figure 1 wherein the notification means notifies of the end of a command). In this system the stripes are stripes of erasure-coded data since the data is subject to parity code protection, which is a form of erasure coding.

Regarding Claim 10, Matsunami discloses the stripe blocks comprising a first number of data blocks and a second number of parity blocks (data is divided into a plurality of data units called stripes, and a group called a parity group is formed of all the stripes... Col. 1, lines 43-46).

Regarding Claim 11, Matsunami discloses the method wherein the query message sent to the storage device (queuing the command in a command queuing means which stores and

manages the commands, Col. 10, lines 45-67) upon which the data block is to be stored includes an identifier of the stripe of erasure coded data (the command are access commands to specific logical addresses and therefore must identify the stripe of erasure coded data using the address, Col. 11, line 63 – Col. 12, line 9).

Regarding Claim 12, Matsunami discloses the method wherein the query messages include a timestamp indicating a current time. Since the system includes a data transfer controller for giving an instruction appropriate transfer timing to the data controller (Col. 10, lines 45-67), a timestamp must be provided with the command in order to properly perform this operation.

Regarding Claims 13 and 14, Matsunami discloses the method wherein the reply messages of the first quorum each indicate that the timestamp is later than a pending write timestamp and later than a validation timestamp of a previous version of the data block. Since the reply message indicates a command start message, the timing of the data transfer controller must indicate that the current time is later than a pending write timestamp (which means that the write can be performed because the previous write has finished) and later than a validation timestamp (which means that the previous version of the data block is no longer valid and therefore, can be modified). See Col. 10, lines 45-67.

Regarding Claims 15, Matsunami discloses the method wherein the query reply message from the storage device upon which the data block is to be stored includes the validation timestamp and the previous version of the data block since these are stored in the block of data the will be written to by the command and the command start message points the system to such a location.

Regarding Claim 16, Matsunami discloses the method wherein each of the modify messages include the timestamp and the validation timestamp. Since the system includes a data transfer controller for giving an instruction appropriate transfer timing to the data controller (Col. 10, lines 45-67), timestamps must be provided with the command in order to properly perform this operation.

Regarding Claim 17, Matsunami discloses the method wherein the modify messages sent to the storage device upon which the data block is to be stored includes the new data block, since the new data block is what is to be stored in its place (modification).

Regarding Claims 18 and 22, Matsunami discloses the method wherein the modify messages sent to the storage device in the form of generated disk commands include the previous version of the data block, since the command points to the location in which this data block is presently stored, and the new data block, since the new data block is what is to be stored in its place (modification).

Regarding Claim 19, Matsunami discloses the method wherein the write reply messages from the second quorum indicate the validation timestamp equals a maximum timestamp for the stripe block stored on the storage device. In receiving a command end message, the system is essentially stating that the timestamp equals the maximum timestamp and therefore, the command has ended.

Regarding Claim 20, Matsunami discloses the method wherein the write reply message from the second quorum indicates that the timestamp if no earlier than the pending write timestamp. In receiving a command end message, the system may be indicating that the previous pending write is still being executed and therefore, the command must wait.

Regarding Claim 21, Matsunami discloses the method wherein the write reply message from the storage device, which stored the data block, indicates that the data block was stored successfully. In the case where no errors are reported, the command end message indicated a successful command completion.

Regarding Claim 23, Matsunami discloses the method wherein the stripe or erasure coded data was previously stored using a technique of striping (as described in Col. 1, lines 38-51).

Claim 25 is rejected using the same rationale as that of Claim 9 wherein the stripe blocks comprise a first number of data blocks and a second number of parity blocks (data is divided into a plurality of data units called stripes, and a group called a parity group is formed of all the stripes..., Col. 1, lines 43-46); the query messages sent to a target storage device include a timestamp indicating a current time. Since the system includes a data transfer controller for giving an instruction appropriate transfer timing to the data controller (Col. 10, lines 45-67), a timestamp must be provided with the command in order to properly perform this operation; and wherein the reply messages of the first quorum each indicate that the timestamp is later than a pending write timestamp and later than a validation timestamp of a previous version of the data block. Since the reply message indicates a command start message, the timing of the data transfer controller must indicate that the current time is later than a pending write timestamp (which means that the write can be performed because the previous write has finished) and later than a validation timestamp (which means that the previous version of the data block is no longer valid and therefore, can be modified). See Col. 10, lines 45-67. The query reply message in the form of a command start message includes the validation timestamp and the previous version of the particular data block since these are stored in the block of data the will be written to by the

command and the command start message points the system to such a location. In receiving a command end message, the system is essentially stating that the timestamp equals the maximum timestamp and therefore, the command has ended.

Claims 26-27 are rejected using the same rationale as that of claim 18.

Claim 35 is rejected using the same rationale as that of Claim 9.

Claim 36 is rejected using the same rationale as that of Claim 10.

Claim 37 is rejected using the same rationale as that of Claim 11.

Claim 38 is rejected using the same rationale as that of Claim 12.

Claim 39 is rejected using the same rationale as that of Claim 13.

Claim 40 is rejected using the same rationale as that of Claim 14.

Claim 41 is rejected using the same rationale as that of Claim 15.

Claim 42 is rejected using the same rationale as that of Claim 16.

Claim 43 is rejected using the same rationale as that of Claim 17.

Claim 44 is rejected using the same rationale as that of Claim 18.

Claim 45 is rejected using the same rationale as that of Claim 19.

Claim 46 is rejected using the same rationale as that of Claim 20.

Claim 47 is rejected using the same rationale as that of Claim 21.

Claim 48 is rejected using the same rationale as that of Claim 22.

Claim 49 is rejected using the same rationale as that of Claim 23.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Midys Rojas whose telephone number is (571) 272-4207. The examiner can normally be reached on M-F 5:30am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sanjiv Shah can be reached on (571) 272-4098. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Midys Rojas
Examiner
Art Unit 2185

MR
March 16, 2007

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